

Mathematics

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(Chapter – 6) (Lines and Angles)(Exemplar Problems)

(Class – IX)

Exercise 6.4

Question 6:

Prove that a triangle must have at least two acute angles.

Answer 6:

Given:

ΔABC is a triangle

To Prove:

ΔABC must have two acute angles.

Proof:

Let us consider the following cases

Case I

When two angles are 90°

Suppose two angles are $\angle B = 90^\circ$ and $\angle C = 90^\circ$

We know that, the sum of all three angles is 180°

$$\therefore \angle A + \angle B + \angle C = 180^\circ$$

$$\therefore \angle A + 90^\circ + 90^\circ = 180^\circ$$

$$\Rightarrow \angle A = 180^\circ - 180^\circ = 0, \text{ which is not possible.}$$

Hence, this case is rejected.

Case II

When two angle are obtuse.

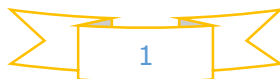
Suppose two angles $\angle B$ and $\angle C$ are more than 90°

We know that, the sum of all three angles is 180°

$$\therefore \angle A + \angle B + \angle C = 180^\circ$$

$$\angle A = 180^\circ - (\angle B + \angle C) = 180^\circ - (\text{Angle greater than } 180^\circ)$$

$$\angle A = \text{negative angle, which is not possible.}$$



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Hence, this case is also rejected.

Case III

When one angle is 90° and other is obtuse.

Suppose angles $\angle B = 90^\circ$ and $\angle C$ is obtuse.

We know that, the sum of all three angles is 180°

$$\begin{aligned}\therefore \quad & \angle A + \angle B + \angle C = 180^\circ \\ \Rightarrow \quad & \angle A = 180^\circ - (90^\circ + \angle C) \\ & = 90^\circ - \angle C \\ & = \text{Negative angle, which is not possible.}\end{aligned}$$

Hence, this case is also rejected.

Case IV

When two angles are acute, then sum of two angles is less than 180° , so that the third angle is also acute.

Hence, a triangle must have at least two acute angles.

